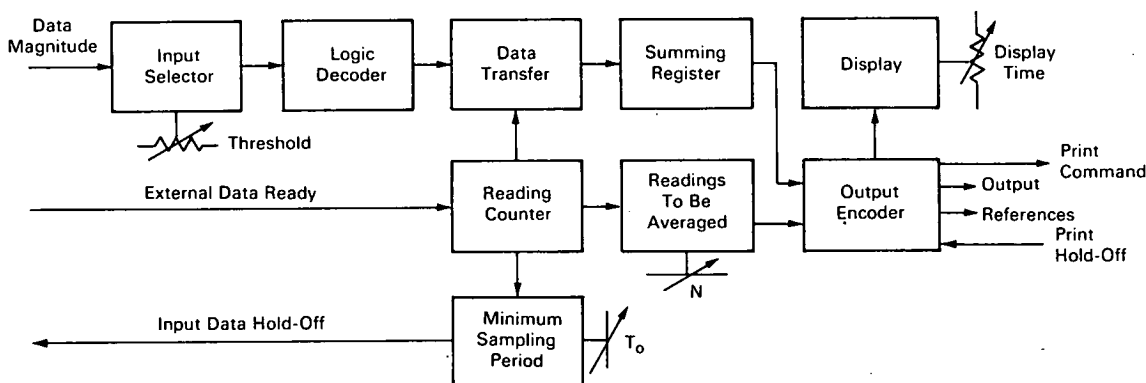


NASA TECH BRIEF



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Digital Data Averager Improves Conventional Measurement System Performance



A multipurpose digital averager has been developed to provide measurement improvement in noisy signal environments. It provides increased measurement accuracy and resolution to basic instrumentation devices by an arithmetical process in real time. It is used with standard conventional measurement equipment and digital data printers. The averager does not introduce error to the converted data, but permits precise measurements not normally obtainable by other than classical filtering prior to measurement and subsequent data conversion.

The general approach used in smoothing the raw data is to sum the magnitudes of input digital data, count the number of successive readings, and divide the former by the latter. The result of this arithmetical operation is generated continuously in real time, concluding in a true statistical average value when the selected number of readings to be averaged has been reached. A selector switch is incorporated to permit input readings to be averaged in powers of 10 covering 10 to 1,000,000 readings.

In operation, data magnitude is buffered and threshold leveled to the logic polarity and amplitude required of the input selector gates, which are involved in the input truncation whereby 7 input digits out of a possible 9 may be used in data transfer and arithmetical operation. The truncated 28 lines of digital data output from the input selector that represent data magnitudes from 10^1 through 10^6 are then transferred into the summing register. The data transfer control signal is derived from the external digital measuring device through its external data ready command that is synchronized at the reading counter. Each external data ready positive going step is progressively totalized in the reading counter in order to account for the preset number of readings to be averaged.

When the preset number of readings (10^1 to 10^6) has been reached, there will be established as a numerical divisor the preset number available to control a gated clock for strobing the summing register dividend data, thus producing a quotient or averaged value. The averaged value is then encoded in the out-

(continued overleaf)

put encoder so the data may be displayed by the visual in-line decimal readouts, or conditioned for transmission and made available for digital printer use.

The minimum sampling period adjustment (T_0) is a series of 10 discrete time constants between 0.1 ms and 40.0 ms which will provide delay between the initiation of external data ready and the control signal, input data hold-off:

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
Reference: B68-10018

Patent status:

No patent action is contemplated by NASA.

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